

# Archives of Microbiology

Founded in 1930 as  
Archiv für Mikrobiologie

## CONTENTS OF VOLUME 172 · 1999

### Editors in Chief

Hauke Hennecke  
*Zürich, Switzerland*

Achim Kröger  
*Frankfurt/Main, Germany*

Michael T. Madigan  
*Carbondale, Ill., USA*

Bernhard Schink  
*Konstanz, Germany*

### Mini-Reviews Editor

A. Böck  
*München, Germany*

### Editorial Board

T. J. Beveridge  
*Guelph, Ontario, Canada*

A. Brakhage  
*Darmstadt, Germany*

V. Braun  
*Tübingen, Germany*

J. A. Breznak  
*East Lansing, Mich., USA*

W. Buckel  
*Marburg, Germany*

J. Cole  
*Birmingham, UK*

S. Cole  
*Paris, France*

F. Daldal  
*Philadelphia, Pa., USA*

S. A. Ensign  
*Logan, Utah, USA*

K.-D. Entian  
*Frankfurt/Main, Germany*

B. Friedrich  
*Berlin, Germany*

G. Fuchs  
*Freiburg, Germany*

T. A. Hansen  
*Groningen, The Netherlands*

L. Hederstedt  
*Lund, Sweden*

D. B. Janssen  
*Groningen, The Netherlands*

P. H. Janssen  
*Parkville, Victoria, Australia*

M. S. M. Jetten  
*Delft, The Netherlands*

D. P. Kelly  
*Warwick, UK*

R. Krämer  
*Köln, Germany*

J. Kronstad  
*Vancouver, B. C., Canada*

J. Krzycki  
*Columbus, Ohio, USA*

T. Leisinger  
*Zürich, Switzerland*

E. Martínez-Romero  
*Cuernavaca, Mexico*

J. Meeks  
*Davis, Calif., USA*

B. Oudega  
*Amsterdam, The Netherlands*

R. Rappuoli  
*Siena, Italy*

T. Ruiz-Argüeso  
*Madrid, Spain*

H. Sahm  
*Jülich, Germany*

A. M. Spormann  
*Stanford, Calif., USA*

F. R. Tabita  
*Columbus, Ohio, USA*

A. Tanaka  
*Kyoto, Japan*

R. Thauer  
*Marburg, Germany*

F. Widdel  
*Bremen, Germany*

D. H. Wolf  
*Stuttgart, Germany*

G. J. Zylstra  
*New Brunswick, N.J., USA*



Springer



# Archives of Microbiology

was founded in 1930 by J. Behrens, F. Boas, A. Rippel. Volumes 1–94 (1973) named "Archiv für Mikrobiologie". From vol. 95 (1974) edited by H.-G. Schlegel and G. Drews; from vol. 115 (1977)–129 (1981) edited by H.-G. Schlegel, S. C. Rittenberg, G. Drews; from vol. 130 (1982) edited by H.-G. Schlegel, J. L. Ingraham, G. Drews; from vol. 144 (1986) edited by H.-G. Schlegel and G. Drews; from vol. 146(3) 1986 edited by H.-G. Schlegel, G. Drews, D. J. Kushner; from vol. 161(2) 1994 edited by H. Hennecke, A. Kröger, B. Schink, and M. T. Madigan as of vol. 162(1/2) 1994.

## Copyright

Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.

All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e.g. as offprints), all translation rights as well as the rights to publish the article in any electronic form. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher.

The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.

*While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.*

## Special regulations for photocopies in the USA

Photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U.S. Copyright Law, provided a fee is paid. All fees should be paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0302-8933, the volume, and the first and last page numbers of each article copied.

The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

The Canada Institute for Scientific and Technical Information (CISTI) provides a comprehensive, world-wide document delivery service for all Springer-Verlag journals. For more information, or to place an order for a copyright-cleared Springer-Verlag document, please contact Client Assistant, Document Delivery, Canada Institute for Scientific and Technical Information, Ottawa K1A 0S2, Canada (Tel: 613-993-9251; Fax: 613-952-8243; e-mail: cisti.docdel@nrc.ca).

This journal is included in the ADONIS service, whereby copies of individual articles can be printed out from compact discs (CD-ROM) on demand. An explanatory leaflet giving further details of the scheme is available from the publishers on request.



Springer

## Printers

Schneider Druck GmbH  
Rothenburg ob der Tauber, Germany

© Springer-Verlag, Berlin Heidelberg 1999

Springer-Verlag GmbH & Co. KG  
Berlin, Germany

Printed in Germany



# Contents of Volume 172 · 1999

- Achenbach LA → Bryantseva IA  
 Aldrich HC → Baker SH  
 Altendorf K → Stallkamp I  
 Amann R → Berchtold M  
 Anderson RW → Bailey J  
 Aßmus B → Fukui M
- Bailey J, Cook LJ, Kilmer-Barber R, Swanston E, Solnica-Krezel L, Lohman K, Dove WF, Dee J, Anderson RW: Identification of three genes expressed primarily during development in *Physarum polycephalum* 364
- Baker SH, Lorbach SC, Rodriguez-Buey M, Williams DS, Aldrich HC, Shively JM: The correlation of the gene *csoS2* of the carboxysome operon with two polypeptides of the carboxysome in *Thiobacillus neapolitanus* 233
- Basu P → Martínez Murillo F  
 Bauda P → Genevaux P  
 Berchtold M, Chatzinotas A, Schönhuber W, Brune A, Amann R, Hahn D, König H: Differential enumeration and in situ localization of microorganisms in the hindgut of the lower termite *Mastotermes darwiniensis* by hybridization with rRNA-targeted probes 407
- Bérubé LR → Grondin A  
 Blackall LL → McSweeney CS  
 Bläsi U → Graschopf A  
 Böttcher ME, Sievert SM, Kuever J: Fractionation of sulfur isotopes during dissimilatory reduction of sulfate by a thermophilic gram-negative bacterium at 60°C 125
- Borges KM → González JM  
 Braus GH → Eckert SE  
 Brune A → Berchtold M  
 Bryantseva IA, Gorlenko VM, Kompantseva EI, Achenbach LA, Madigan MT: *Helioestis daurensis*, gen. nov. sp. nov., an alkaliphilic rod-to-coiled-shaped phototrophic heliobacterium from a Siberian soda lake 167
- Bryniok D → Koziollek P  
 Burton NP, Williams TD, Norris PR: Carboxylase genes of *Sulfolobus metallicus* 349
- Chatzinotas A → Berchtold M  
 Cook LJ → Bailey J  
 Coolen MJL → Overmann J  
 Cordwell SJ: Microbial genomes and "missing" enzymes: redefining biochemical pathways 269
- Dammann-Kalinowski T → Niemann S  
 Davis JK, He Z, Somerville CC, Spain JC: Genetic and biochemical comparison of 2-aminophenol 1,6-dioxygenase of *Pseudomonas pseudoalcaligenes* JS45 to meta-cleavage dioxygenases: divergent evolution of 2-aminophenol meta-cleavage pathway 330
- De Almeida MES, Newton SM, Ferreira LCS: Antibody responses against flagellin in mice orally immunized with attenuated *Salmonella* vaccine strains 102
- Dee J → Bailey J  
 Del Dot T → McSweeney CS  
 Ding Y-HR → Ronimus RS  
 Dohrmann A-B, Müller V: Chloride dependence of endospore germination in *Halobacillus halophilus* 264
- Dove WF → Bailey J  
 Dowhan W → Stallkamp I  
 DuBow MS → Genevaux P  
 Dulieu A → McSweeney CS
- Eberz G → Ludwig C  
 Ecker S → Ludwig C  
 Eckert SE, Hoffmann B, Wanke C, Braus GH: Sexual development of *Aspergillus nidulans* in tryptophan auxotrophic strains 157
- Eder W, Ludwig W, Huber R: Novel 16S rRNA gene sequences retrieved from highly saline brine sediments of Kebrit Deep, Red Sea 213
- Ernst A → Postius C
- Ferreira LCS → De Almeida MES  
 Forchhammer K → Sauer J  
 Frigaard N-U → Tokita S  
 Fukui M, Teske A, Aßmus B, Muyzer G, Widdel F: Physiology, phylogenetic relationships, and ecology of filamentous sulfate-reducing bacteria (genus *Desulfonema*) 193
- Galushko AS → Müller JA  
 Garcia-Pichel F → Portwich A  
 Genevaux P, Bauda P, DuBow MS, Oudega B: Identification of Tn10 insertions in the *rfaG*, *rfaP*, and *galU* genes involved in lipopolysaccharide core biosynthesis that affect *Escherichia coli* adhesion 1
- Glaeser J, Overmann J: Selective enrichment and characterization of *Roseospirillum parvum*, gen. nov. and sp. nov., a new purple nonsulfur bacterium with unusual light absorption properties [Erratum] 129
- Görl M → Sauer J  
 Götz F → Neubauer H  
 Gómez P, Ribas-Aparicio RM, Pélaez AI, Rosario Rodicio M: Characterization of IS1389, a new member of the IS3 family of insertion sequences isolated from *Xanthomonas campestris* pv. *amaranthicola* 15
- González JM, Sheckells D, Viebahn M, Krupatkin D, Borges KM, Robb FT: *Thermococcus waiotapuensis* sp. nov., an extremely thermophilic archaeon isolated from a freshwater hot spring 95
- Gorlenko VM → Bryantseva IA  
 Gottschalk G → Khmelenina VN  
 Graschopf A, Bläsi U: Functional assembly of the  $\lambda$  S holin requires periplasmic localization of its N-terminus 31
- Grondin A, Jarrell HC, Bérubé LR: Discontinuous expansion linked to sector formation in *Pseudomonas aeruginosa* colonies 59
- Gross R, Simon J, Kröger A: The role of the twin-arginine motif in the signal peptide encoded by the *hydA* gene of the hydrogenase from *Wolinella succinogenes* 227
- Gugliuzza T → Martínez Murillo F  
 Gutiérrez-Corona JF → Zazueta-Sandoval R
- Hagemann M → Vinnemeier J  
 Hahn D → Berchtold M  
 Halbleib CM, Ludden PW: Characterization of the interaction of dinitrogenase reductase-activating glycohydrolase from *Rhodospirillum rubrum* with bacterial membranes 51
- Hammer E → Lottmann J  
 Han J-I, Lontoh S, Semrau JD: Degradation of chlorinated and brominated hydrocarbons by *Methylobacterium album* BG8 393
- Harms G, Rabus R, Widdel F: Anaerobic oxidation of the aromatic plant hydrocarbon *p*-cymene by newly isolated denitrifying bacteria 303
- He Z → Davis JK  
 Heider J → Zengler K  
 Heising S, Richter L, Ludwig W, Schink B: *Chlorobium ferrooxidans* sp. nov., a phototrophic green sulfur bacterium that oxidizes ferrous iron in coculture with a "*Geospirillum*" sp. strain 116
- Hirota M → Tokita S  
 Hoffmann B → Eckert SE  
 Huber R → Eder W
- Janausch IG, Uden G: The *dcuD* (former *yhcl*) gene product of *Escherichia coli* as a member of the DcuC family of C4-dicarboxylate carriers: lack of evident expression 219
- Jansen M → Jonkers HM  
 Jarrell HC → Grondin A  
 Jonkers HM, Jansen M, Van der Maarel MJEC, Van Gernerden H: Aerobic turnover of dimethyl sulfide by the anoxygenic phototrophic bacterium *Thiocapsa roseopersicina* 150
- Jung K → Stallkamp I
- Kalyuzhnaya MG → Khmelenina VN  
 Kanai T, Ogawa K, Ueda M, Tanaka A: Expression of the *SNF1* gene from *Candida tropicalis* is required for growth on various carbon sources, including glucose 256
- Kappler A → Müller JA



- Kaprelyants AS → Mukamolova GV  
 Kell DB → Mukamolova GV  
 Kelly DP, Murrell JC: Microbial metabolism of methanesulfonic acid 341  
 Kelly DP → Reichenbecher W  
 Khmelenina VN, Kalyuzhnaya MG, Sakharovsky VG, Suzina NE, Trotsenko YA, Gottschalk G: Osmoadaptation in halophilic and alkaliphilic methanotrophs 321  
 Kilmer-Barber R → Bailey J  
 Kletzin A → Zimmermann P  
 Knackmuss H-J → Koziollek P  
 König H → Berchtold M  
 Kompantseva EI → Bryantseva IA  
 Kormer SS → Mukamolova GV  
 Koziollek P, Bryniok D, Knackmuss H-J: Ethene as an auxiliary substrate for the cooxidation of *cis*-1,2-dichloroethene and vinyl chloride 240  
 Kröger A → Gross R  
 Krupatkina D → González JM  
 Kuever J → Böttcher ME
- Laska S → Zimmermann P  
 Leclercque A → Stamm I  
 Lindgren P-E → Neubauer H  
 Lohman K → Bailey J  
 Lontoh S → Han J-I  
 Lorbach SC → Baker SH  
 Lottmann J, Hammer E, Schauer F: Methyl ketone formation during degradation of phenoxybutyric acid by *Penicillium canescens* SBUG-M 1139 417  
 Ludden PW → Halbleib CM  
 Ludwig C, Ecker S, Schwindel K, Rast H-G, Stetter KO, Eberz G: Construction of a highly bioluminescent *Nitrosomonas* as a probe for nitrification conditions 45  
 Ludwig C, Ecker S, Schwindel K, Rast H-G, Stetter KO, Eberz G: Construction of a highly bioluminescent *Nitrosomonas* as a probe for nitrification conditions [Erratum] 130  
 Ludwig W → Eder W  
 Ludwig W → Heising S
- Madigan MT → Bryantseva IA  
 Martin VJJ, Yu Z, Mohn WW: Recent advances in understanding resin acid biodegradation: microbial diversity and metabolism 131  
 Martínez Murillo F, Gugliuzza T, Senko J, Basu P, Stolz JF: A heme-C-containing enzyme complex that exhibits nitrate and nitrite reductase activity from the dissimilatory iron-reducing bacterium *Geobacter metallireducens* 313  
 Matsuura K → Tokita S  
 McSweeney CS, Dulieu A, Webb RI, Del Dot T, Blackall LL: Isolation and characterization of a *Clostridium* sp. with cinnamoyl esterase activity and unusual cell envelope ultrastructure 139  
 Mizunoe Y, Wai SN, Takade A, Yoshida S: Restoration of culturability of starvation-stressed and low-temperature-stressed *Escherichia coli* O157 cells by using H<sub>2</sub>O<sub>2</sub>-degrading compounds 63
- Mochizuki K: Purification and characterization of 5-oxo-L-prolinase from *Paecilomyces varioti* F-1, an ATP-dependent hydrolase active with L-2-oxothiazolidine-4-carboxylic acid 182  
 Mohn WW → Martin VJJ  
 Morgan HW → Ronimus RS  
 Müller JA, Galushko AS, Kappler A, Schink B: Anaerobic degradation of *m*-cresol by *Desulfobacterium cetonicum* is initiated by formation of 3-hydroxybenzylsuccinate 287  
 Müller V → Dohrmann A-B  
 Mukamolova GV, Kormer SS, Kell DB, Kaprelyants AS: Stimulation of the multiplication of *Micrococcus luteus* by an autocrine growth factor 9  
 Murrell JC → Kelly DP  
 Murrell JC → Reichenbecher W  
 Muyzer G → Fukui M
- Nagel A → Niemann S  
 Neubauer H, Pantel I, Lindgren P-E, Götz F: Characterization of the molybdate transport system ModABC of *Staphylococcus carnosus* 109  
 Newton SM → De Almeida MES  
 Niemann S, Dammann-Kalinowski T, Nagel A, Pühler A, Selbitschka W: Genetic basis of enterobacterial repetitive intergenic consensus (ERIC)-PCR fingerprint pattern in *Sinorhizobium meliloti* and identification of *S. meliloti* employing PCR primers derived from an ERIC-PCR fragment 22  
 Norris PR → Burton NP
- Ogawa K → Kanai T  
 Oudega B → Genevaux P  
 Overhage J → Priefert H  
 Overmann J, Coolen MJL, Tuschak C: Specific detection of different phylogenetic groups of chemocline bacteria based on PCR and denaturing gradient gel electrophoresis of 16S rRNA gene fragments 83  
 Overmann J → Glaeser J
- Pantel I → Neubauer H  
 Pélaez AI → Gómez P  
 Plaga W → Stamm I  
 Portwich A, Garcia-Pichel F: Ultraviolet and osmotic stresses induce and regulate the synthesis of mycosporines in the cyanobacterium *Chlorogloeopsis* PCC 6912 187  
 Postius C, Ernst A: Mechanisms of dominance: coexistence of picocyanobacterial genotypes in a freshwater ecosystem 69  
 Priefert H, Overhage J, Steinbüchel A: Identification and molecular characterization of the eugenol hydroxylase genes (*ehyA/ehyB*) of *Pseudomonas* sp. strain HR199 354  
 Pühler A → Niemann S
- Rabus R → Harms G  
 Rast H-G → Ludwig C  
 Reichenbecher W, Kelly DP, Murrell JC: Desulfonation of propanesulfonic acid by *Comamonas acidovorans* strain P53: evidence for an alkanesulfonate sulfonate and an atypical sulfite dehydrogenase 387  
 Ribas-Aparicio RM → Gómez P  
 Richter L → Heising S  
 Robb FT → González JM  
 Rodriguez-Buey M → Baker SH  
 Ronimus RS, Morgan HW, Ding Y-HR: Phosphofructokinase activities within the order Spirochaetales and the characterization of the pyrophosphate-dependent phosphofructokinase from *Spirochaeta thermophila* 401  
 Rosario Rodicio M → Gómez P  
 Rosselló-Mora R → Zengler K
- Sakharovsky VG → Khmelenina VN  
 Sauer J, Görl M, Forchhammer K: Nitrogen starvation in *Synechococcus* PCC 7942: involvement of glutamine synthetase and NtcA in phycobiliprotein degradation and survival 247  
 Schauer F → Lottmann J  
 Schink B → Heising S  
 Schink B → Müller JA  
 Schönhuber W → Berchtold M  
 Schwindel K → Ludwig C  
 Selbitschka W → Niemann S  
 Semrau JD → Han J-I  
 Senko J → Martínez Murillo F  
 Sheckells D → González JM  
 Shimada K → Tokita S  
 Shively JM → Baker SH  
 Sievert SM → Böttcher ME  
 Simon J → Gross R  
 Solnica-Krezel L → Bailey J  
 Somerville CC → Davis JK  
 Spain JC → Davis JK  
 Stallkamp I, Dowhan W, Altendorf K, Jung K: Negatively charged phospholipids influence the activity of the sensor kinase KdpD of *Escherichia coli* 295  
 Stamm I, Leclercque A, Plaga W: Purification of cold-shock-like proteins from *Stigmatella aurantiaca* – molecular cloning and characterization of the *cspA* gene 175  
 Steinbüchel A → Priefert H  
 Stetter KO → Ludwig C  
 Stolz JF → Martínez Murillo F  
 Suzina NE → Khmelenina VN  
 Swanston E → Bailey J
- Takade A → Mizunoe Y  
 Tanaka A → Kanai T  
 Teske A → Fukui M  
 Tokita S, Hirota M, Frigaard N-U, Shimada K, Matsuura K: Pheophytinization of bacteriochlorophyll *c* and energy transfer in cells of *Chlorobium tepidum* 40  
 Trotsenko YA → Khmelenina VN  
 Tuschak C → Overmann J
- Ueda M → Kanai T  
 Uden G → Janssch IG
- Van der Maarel MJEC → Jonkers HM  
 Van Gemerden H → Jonkers HM  
 Viebahn M → González JM  
 Vinnemeier J, Hagemann M: Identification of salt-regulated genes in the genome of

the cyanobacterium *Synechocystis* sp.  
strain PCC 6803 by subtractive RNA  
hybridization 377

Yoshida S → Mizunoe Y  
Yu Z → Martin VJJ

Zazueta-Sandoval R, Gutiérrez-Corona JF:  
Developmental and environmental in-  
fluences in the production of a single  
NAD-dependent fermentative alcohol  
dehydrogenase by the zygomycete  
*Mucor rouxii* 280

Zengler K, Heider J, Rosselló-Mora R,  
Widdel F: Phototrophic utilization of  
toluene under anoxic conditions by a

new strain of *Blastochloris sulfovirdis*  
204

Zimmermann P, Laska S, Kletzin A:  
Two modes of sulfite oxidation in the  
extremely thermophilic and acidophilic  
archaeon *Acidianus ambivalens* 76

Indexed in *Current Contents*  
and *Index Medicus*

Wai SN → Mizunoe Y  
Wanke C → Eckert SE  
Webb RI → McSweeney CS  
Widdel F → Fukui M  
Widdel F → Harms G  
Widdel F → Zengler K  
Williams DS → Baker SH  
Williams TD → Burton NP



